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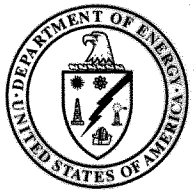
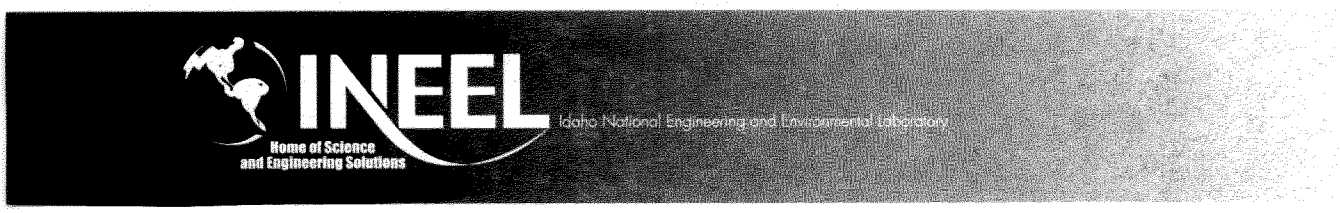


U.S. Department of Energy
Idaho Operations Office

Operable Unit 3-13, Group 3, Other Surface Soils, Prioritization and Site Grouping Report



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Operable Unit 3-13, Group 3, Other Surface Soils, Prioritization and Site Grouping Report

September 2002

Prepared for the
U.S. Department of Energy
Idaho Operations Office

ABSTRACT

The Idaho Nuclear Technology and Engineering Center Waste Area Group (WAG) is one of ten Idaho National Engineering and Environmental Laboratory WAGs identified in the Federal Facility Agreement and Consent Order by the U.S. Department of Energy Idaho Operations Office, the U.S. Environmental Protection Agency Region 10, and the Idaho Department of Health and Welfare. Within WAG 3, Operable Unit (OU) 3-13 consists of the Idaho Nuclear Technology and Engineering Center, except for the injection well (CPP-23) and the tank farm.

The *Remedial Design/Remedial Action (RD/RA) Scope of Work (SOW) for WAG 3, OU 3-13* initiated the RD/RA process for each remedy under the OU 3-13 Record of Decision and established the framework and overall strategy for managing the remedial design process through commencement of remedial action work elements. The RD/RA SOW mandated preparation of this primary document, Prioritization and Site Grouping Report, which presents the criteria and multi-criteria analysis used to determine how the Group 3, Other Surface Soils, release sites were grouped together and how these remediation sets were prioritized for remediation. Some Group 3 sites overlap and/or extend under buildings or structures. These are examined for concurrent remediation and/or partial or complete management with the Group 2, Soils Under Buildings, release sites. A systematic plan of action to address variations in anticipated contaminants, contaminant levels, or volumes of contamination encountered during remediation activities is presented. Cost evaluations for capping versus excavation and that of on-Site versus off-Site disposal are also presented. Information from this report will be used in the Group 3 soils RD/RA work plan, which will include evaluating and scheduling the prioritized remediation sets.

CONTENTS

FIGURES

TABLES

ACRONYMS

ARAR	applicable or relevant and appropriate requirement
BBWI	Bechtel BWXT Idaho, LLC
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFLUP	Comprehensive Facility and Land Use Plan
CPP	Chemical Processing Plant
COC	contaminant of concern
D&D&D	deactivation, decontamination, and decommissioning
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations
EDF	Engineering Design File
EPA	Environmental Protection Agency
ER	environmental restoration
FFA/CO	Federal Facility Agreement and Consent Order
FS	feasibility study
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
ICPP	Idaho Chemical Processing Plant
IDEQ	Idaho Department of Environmental Quality
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LDR	land disposal restriction
OU	operable unit
PCB	polychlorinated biphenyl
PEW	process equipment waste

RA	remedial action
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SME	subject matter expert
TSCA	Toxic Substances Control Act
VE	value engineering
WAC	Waste Acceptance Criteria
WAF	waste acceptance forms
WAG	waste area group
WCF	Waste Calcining Facility
WINCO	Westinghouse Idaho Nuclear Company

Operable Unit 3-13, Group 3, Other Surface Soils, Prioritization and Site Grouping Report

1. INTRODUCTION

This report, mandated by the *Remedial Design/Remedial Action (RD/RA) Scope of Work (SOW) for Waste Area Group 3, Operable Unit 3-13*, (DOE-ID 2000a) presents the criteria and multi-criteria analysis used to determine how the Group 3, Other Surface Soils, release sites were grouped together and how these sets of sites were prioritized for remediation. Located at the Idaho National Engineering and Environmental Laboratory (INEEL) (Figure 1-1), the Group 3 soils consist of 29 release sites scattered across Idaho Nuclear Technology and Engineering Center (INTEC) (Figure 1-2). These 29 release sites also include two release sites from Operable Unit (OU) 3-13, Group 2, Soils Under Buildings, and one new site, CPP-37c, which is southeast of CPP-37b (see Table 1-1). The primary contaminants of concern in Group 3 are radionuclides and metals. These release sites are generally accessible and are the result of spills, leaks, discharges, and system failures associated with operation of the INTEC facility. This also includes soil piles and boxes of soil and debris from past activities in Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) release areas, most notably, materials generated from the INTEC tank farm. The purpose of remediating the Group 3 sites is to remove high-risk contaminated soils that are not under buildings and to place them in a lower-risk configuration in the INEEL CERCLA Disposal Facility (ICDF).[a] Because remediation activities at Group 3 release sites are dependent on the opening of the ICDF, these activities will occur in 2003 or later.

Some Group 3 release sites overlap and/or extend under buildings or structures. These are evaluated for phased remediation. A systematic plan of action to address variations in anticipated contaminants, contaminant levels, or volumes of contamination encountered during remediation activities is presented. Cost evaluations for capping versus excavation and on-Site versus off-Site disposal are also presented. Ultimately, this document will be incorporated into the Group 3 soils remedial design/remedial action (RD/RA) work plan and will not be considered final until the work plan is finalized. The work plan will further evaluate and schedule the prioritized sets of release sites; address management of the release sites, phasing portions of those sites that currently underlie structures, and include the remediation approach presented in Section 6 of this report.

1.1 Background

The INTEC, formerly known as the Idaho Chemical Processing Plant (ICPP), is located in the south-central area of the INEEL in southeastern Idaho (see Figure 1-1). From 1952 to 1992, operations at INTEC primarily involved reprocessing spent nuclear fuel from defense projects, which entailed extracting reusable uranium from the spent fuels. Liquid waste generated from the reprocessing activities, which ceased in 1992, is stored in an underground tank farm at INTEC. Both soil and groundwater contamination has resulted from these previous operations. Under the Federal Facility Agreement and Consent Order (FFA/CO), the U.S. Environmental Protection Agency (EPA), Idaho Department of

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a. The ICDF, located at the south end of INTEC, consists of the ICDF landfill; the Staging, Storage, Sizing, and Treatment Facility (SSSTF) that will provide waste treatment and interface support capabilities; and evaporation ponds. The ICDF, currently under construction, will meet DOE Order 435.1, Resource Conservation and Recovery Act (RCRA) Subtitle C (42 USC 6921 et seq.), and Toxic Substance Control Act (TSCA) polychlorinated biphenyl (PCB) landfill design and construction requirements (15 USC 2601 et seq.).

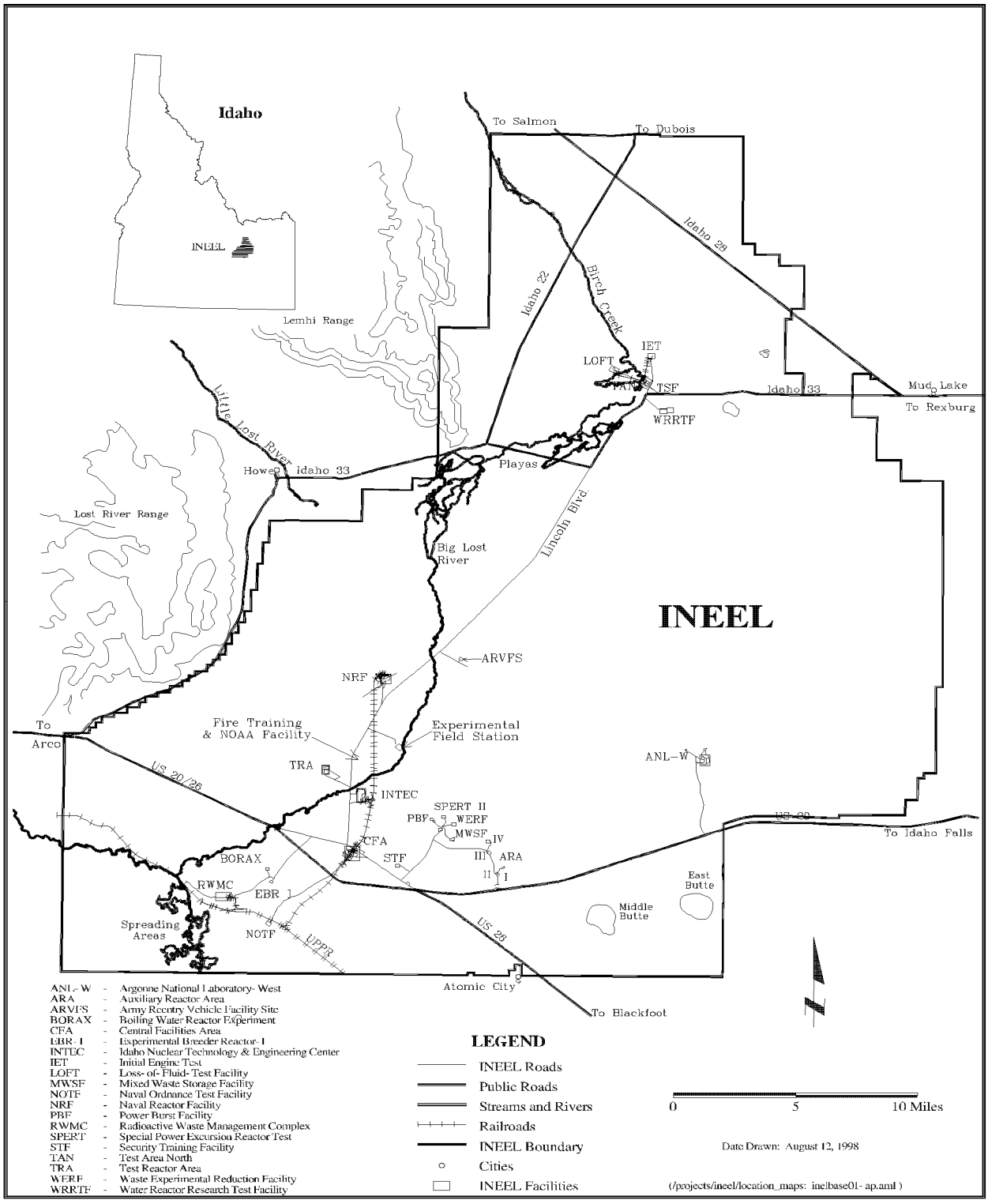


Figure 1-1. Location of INTEC within the INEEL.

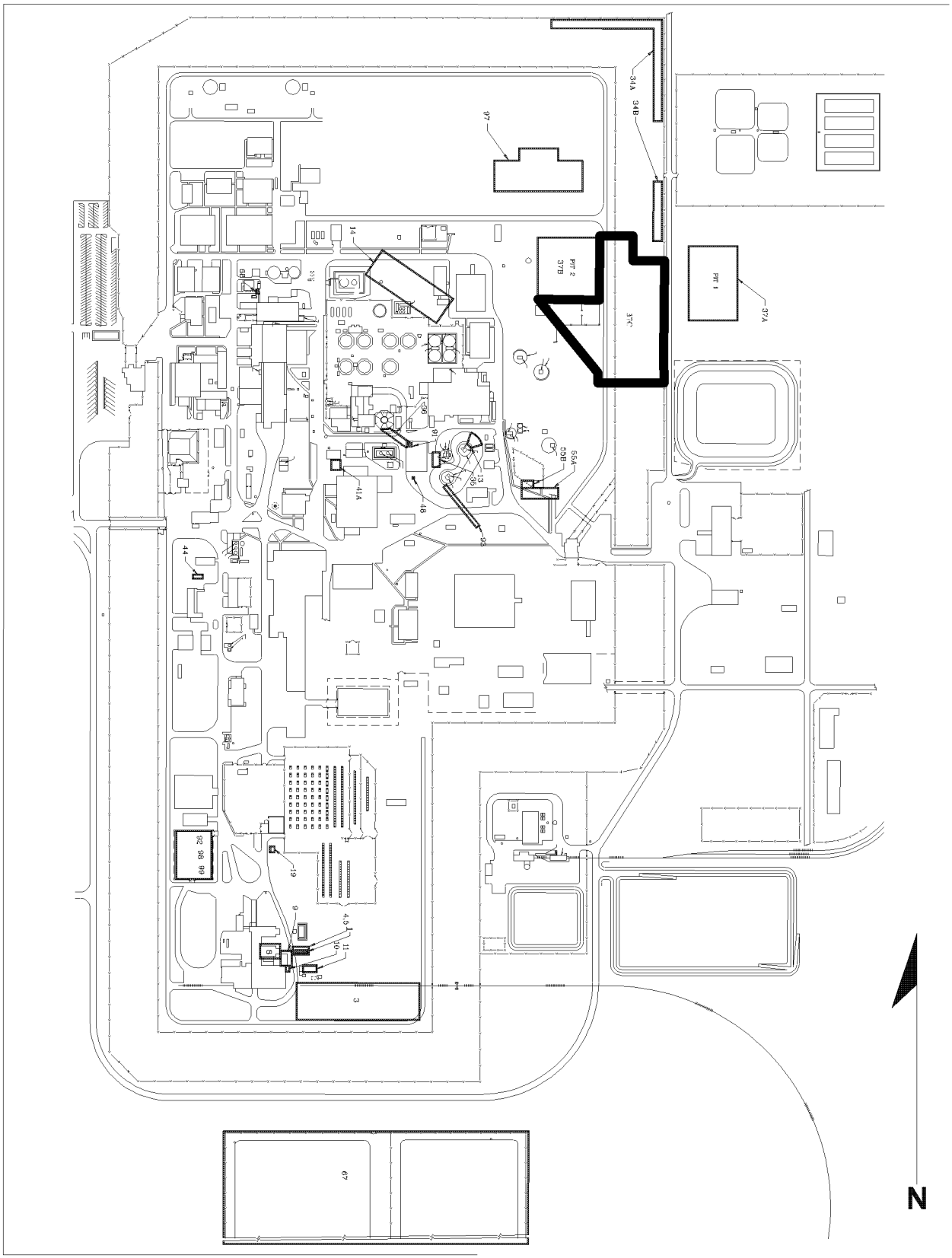


Figure 1-2. Group 3, Other Surface Soils, numbered release sites (see Table 1-1 for legend).

Table 1-1. Group 3, Other Surface Soils, numbered release sites.

Site	Description
CPP-01	Concrete settling basins and dry wells east of CPP-603
CPP-03	Temporary storage area southeast of CPP-603
CPP-04	Contaminated soil area around CPP-603 settling tank
CPP-05	Contaminated soil area around CPP-603 settling basin
CPP-08	CPP-603 basin filter system line failure
CPP-09	Soil contamination at northeast corner of CPP-603 south basin
CPP-10	CPP-603 plastic pipeline break
CPP-11	CPP-603 sludge and water release
CPP-13	Pressurization of solid storage cyclone northeast of CPP-633
CPP-14	Old Sewage Treatment Plant west of CPP-664
CPP-19	CPP-603 to CPP-604 line leak
CPP-34A/B	Soil storage area (disposed trenches) in the northeast corner of the ICPP (INTEC)
CPP-35	CPP-633 decontamination spill
CPP-36	Transfer line leak from CPP-633 to WL-102
CPP-37a	Gravel pit—outside INTEC fence
CPP-37b	Gravel pit and debris landfill inside INTEC fence
CPP-37c[a]	Contamination discovered Southeast of CERCLA Site CPP-37b
CPP-41a[b]	Fire training pit near NW corner of CPP-663, under asphalt
CPP-44	Grease pit south of CPP-608
CPP-48	French drain south of CPP-633
CPP-55	Mercury-contaminated area south of CPP T-15
CPP-67	CPP Percolation Ponds #1 and #2
CPP-68[2]	Abandoned gasoline tank CPP VES-UTI-652 (North of Building 606)
CPP-91	CPP-633 blower pit drain
CPP-92	Soil boxes west of CPP-1617
CPP-93	Simulated calcine disposal trench
CPP-97	Tank farm soil stockpile
CPP-98	Tank farm shoring boxes
CPP-99	Boxed soil

a. New site added to Group 3, Other Surface Soils.

b. Group 2, Soils Under Buildings and Structures, site transferred to Group 3, Other Surface Soils, in the Group 2 Building Drainage Evaluation Plan (DOE-ID 2000b).

Environmental Quality (IDEQ), and U.S. Department of Energy Idaho Operations Office (DOE-ID) (collectively referred to as the Agencies) are directing cleanup activities to reduce human health and environmental risks to acceptable levels. Per the FFA/CO, INTEC is designated as Waste Area Group (WAG) 3. In order to facilitate remediation of the INTEC, WAG 3 was further divided into OUs comprised of individual contaminant release sites.

Several phases of investigation have been performed at the OUs within WAG 3. A comprehensive remedial investigation/feasibility study (RI/FS) was conducted for OU 3-13 to determine the nature and extent of contamination and corresponding potential risks to human health and the environment under various exposure pathways and scenarios. Based on the RI/FS results, INTEC release sites were further segregated into seven groups based on contaminants of concern, accessibility, or geographic proximity to allow development and analysis of remedial action alternatives. The Other Surface Soils were designated as Group 3 within OU 3-13. These release sites are principal threat wastes due to potential external exposure of workers or the public to radionuclide-contaminated soils.

The Final Record of Decision (ROD) for INTEC OU 3-13 states

> The purpose of the selected remedy is to prevent external exposure to radionuclides at these sites and to allow these sites to be released for unrestricted use in the future. The selected remedy for Other Surface Soils is Removal and Onsite Disposal in the INEEL CERCLA Disposal Facility (ICDF). Those Group 3 release sites that, prior to excavation, are identified as part of the footprint of another program's closure activity and that, to the Agencies' satisfaction, will be closed with equivalent protection to that afforded by the ICDF to groundwater and future users, will not be excavated but instead capped in place pursuant to the hazardous waste landfill closure substantive requirements of IDAPA 16.01.05.008 (40 CFR 264.310). (DOE-ID 1999)

For sites that are identified as part of the footprint of another program, the closure or remediation of the site that is regulated by a program other than CERCLA will address the requirements of the applicable regulations (e.g., HWMA). How the requirements of other programs are met will be negotiated and included in the Group 3 remedial design/remedial action process.

Sites with probable permanent (post-2095) land use controls (i.e., portions of sites underlying buildings or structures or that are capped in place as part of another program) will be added to the WAG 3 Institutional Control Plan (DOE-ID 2001a).

1.2 Objectives

The objectives of this report, as described in the WAG 3 RD/RA Scope of Work, are to do the following:

- Identify Group 3 sites where remediation may need to be phased or deferred due to accessibility of the contaminated soil as a result of INTEC infrastructure
- Present the criteria and multi-criteria analysis used to determine how the Group 3 release sites are grouped into remediation sets and prioritization of these sets
- Present the Group 3 remediation sets and their priority
- Present the evaluation and comparison of capping versus excavation

- Present a cost evaluation of on-Site disposal at ICDF versus off-Site disposal
- Present the logic for approaching the Group 3 remedial action.

1.3 Approach

The approach used to develop criteria for prioritizing and determining how the release sites should be grouped together and the data needs for ranking the sites against the criteria are presented in Section 3. Six mutually exclusive criteria were defined and assigned weight factors that reflect the level of importance of each criterion, that the sites were ranked against. A complete description of the criteria development is given in Section 3.1. Out of this effort, the sites were grouped into the following six sets identified in order of decreasing priority:

1. Sites with planned use potential within 10 years
2. Sites with planned use potential beyond 10 years
3. Easily accessible sites with moderate environmental risk reduction
4. Sites east of CPP-603 with significant environmental risk reduction
5. Sites in the Waste Calcining Facility (WCF) area with high environmental risk reduction, but significant INTEC coordination issues
6. Sites with no planned use and minimal environmental risk reduction.

2. RECOMMENDATION TO REMEDIATE SPECIFIC GROUP 3 SITES IN PHASES

This section evaluates several Group 3 sites that extend under buildings or structures and recommends remediating these sites in phases depending on accessibility of the contaminated soils. For example, a portion of a Group 3 site that is accessible will be remediated in the near term and the remainder of the site will be remediated or capped when the obstruction is no longer present. Site descriptions and data are presented, demonstrating that buildings overlie all or a significant portion of these sites. Sites CPP-08/09 and CPP-10 are likely to extend under Building CPP-603. All of CPP-91 and a portion of CPP-36 are identified as being under the CPP-633 WCF monolith. The northwest end of CPP-36 may extend beneath the INTEC stack.

During remediation, other Group 3 site excavations may expand close enough toward a building or structure that excavating beneath the structure is not feasible. If contamination appears to continue beneath the building, the portion of the site below the building will be remediated separately or capped when the building is no longer present.

Remediation of Group 3 soil contamination that extends under buildings and structures as separate phases will also ensure that the presence of the contaminated soils is documented and is addressed by institutional controls until the overlying building is closed and deactivation, decontamination, and decommissioning (D&D&D) have occurred.

2.1 Sites CPP-08/09 and CPP-10

2.1.1 Description of Site(s)

Sites CPP-08 and CPP-09 were combined during the Track 2 evaluation (INEL 1995). The CPP-08 site was the result of a leak in a filter recirculation line that ran parallel to and along the south and east sides of Building CPP-603. The line was abandoned and replaced with an aboveground line. The exact location of the leak in the recirculation line was never determined. The location of contamination associated with CPP-08 was arbitrarily chosen as being beneath the basin area of Building CPP-603. Sites CPP-08, -09, and –10 are shown as one site in Figure 2-1. Site CPP-09 was identified when contaminated soil was encountered during replacement of a fire water line on the east side of CPP-603. This contaminated soil is believed to be associated with the CPP-08 line leak as the filter recirculation line ran through this location, and the two sites were combined.

Site CPP-10 was originally described as the location of a release of radioactively contaminated fluid. A small quantity of basin water drained through a personnel access door and contaminated a small area of asphalt and dirt adjacent to CPP-603. Site CPP-10 initially was perceived to be the soils overlying CPP-08/09. However, a soil boring drilled during the CPP-10 Track 2 investigation encountered higher levels of radioactive contaminated soils at greater depths than were encountered at Site CPP-08/09. Therefore, Site CPP-10 was inferred to have a subsurface-release component.

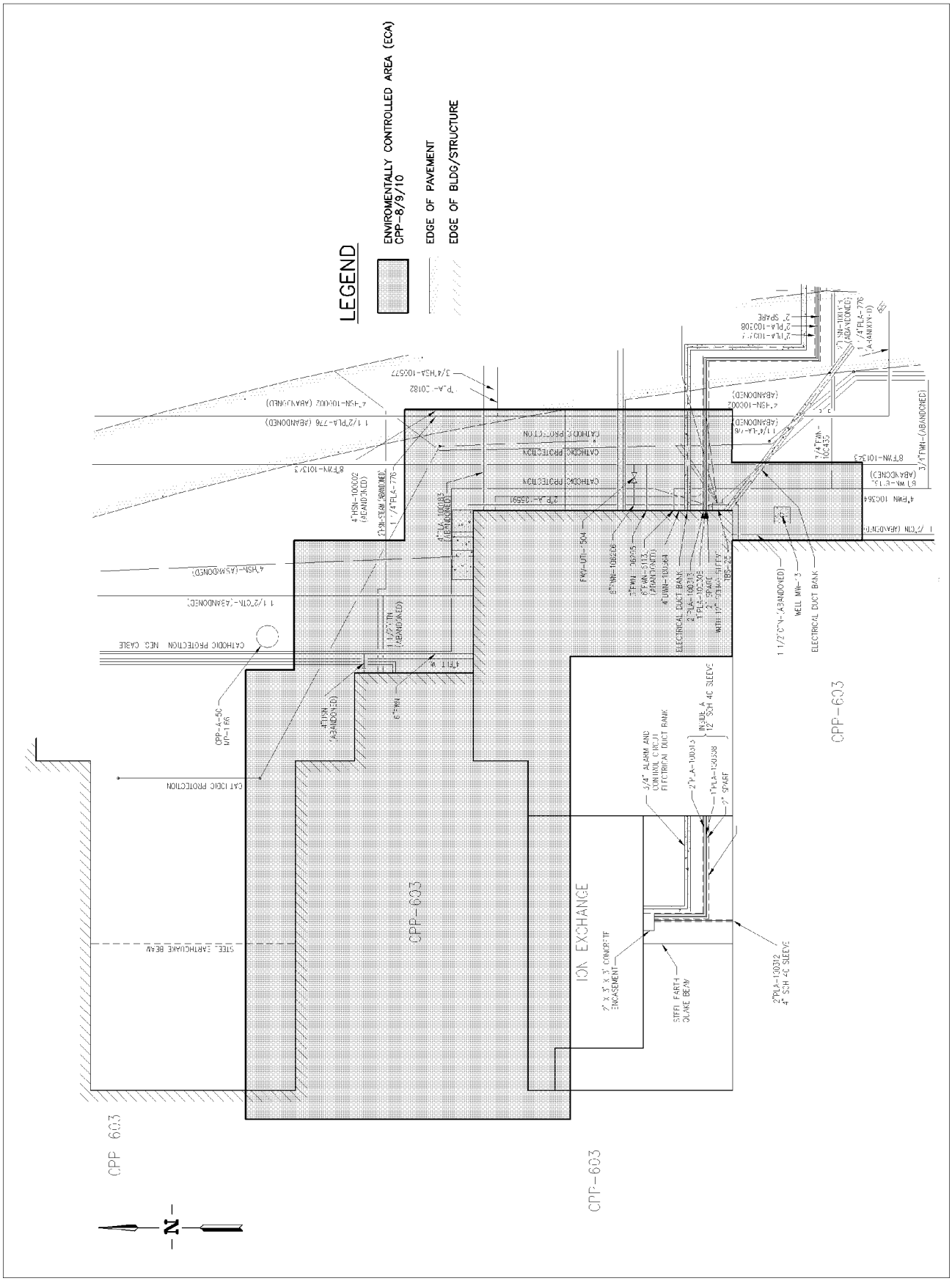


Figure 2-1. Environmentally controlled area CPP-08/09 and CPP-10.

2.1.2 CPP-08/09 and CPP-10 Data Review

For remediation purposes, Site CPP-10 should be combined with Site CPP-08/09 as they overlap at the surface. Contamination at depth for CPP-10 may be the result of the same source. The subsurface contaminants are similar for both sites.

Information in the *Final Preliminary Scoping Track 2 Summary Report for Operable Unit 3-09* (INEL 1995) and the *Comprehensive RI/FS for Idaho Chemical Processing Plant OU 3-13* (DOE-ID 1997) was reviewed for CPP-08/09 and CPP-10. One boring was drilled for CPP-08/09 (CPP-08-1) and one for CPP-10 (CPP-10-1).

In CPP-08-1 the highest radioactivity (3,000 cpm) was encountered at the 2 to 4 ft depth. The 6- to 8-ft sample screened at 1000 to 2200 cpm, and the sample from 14 to 16 ft below ground surface (bgs) was screened at 500 cpm above background. The highest activity levels at CPP-08/09 were Cs-137 (1,080 pCi/g) and Sr-90 (140 pCi/g). The zone of contamination extends from the surface to the soil/basalt interface at 29 to 31 ft. No sample from the soil/basalt interface was quantitatively analyzed.

In CPP-10-1, the highest radioactivity (20,000 cpm above background) was at 2- to 4-ft bgs; at 20 to 22 ft, the sample was screened at 4,000 cpm; and at 30 to 33.9 ft, the soil still screened at 500 to 700 cpm (INEL 1995, Table 3-5). At CPP-10-1, a sample collected just above the sedimentary interbed at 106 ft contained six radionuclides at activities above background. These were Cs-137 (39.7 pCi/g), Co-60 (3.18 pCi/g), Eu-152 (9.16 pCi/g), Eu-154 (5.7 pCi/g), Eu-155 (1.48 pCi/g), and Sr-90 (41.7 pCi/g). Boring CPP-10-1 was converted to a monitoring well, MW-13.

Soil contaminant levels encountered were higher in the boring for CPP-10 than for CPP-08/09 and extended to greater depths. DOE-ID (1997) noted that this level and extent of subsurface contamination for Site CPP-10 is not consistent with a small surface spill. Site CPP-10 overlaps the surface of Site CPP-08/09 and they may all be the result of the same source of subsurface contamination. The subsurface contaminants are similar for both sites; therefore, all three sites should be combined into one for remediation purposes.

2.1.3 Status and Future of Building CPP-603

The Comprehensive Facility Land Use Plan (CFLUP) (DOE-ID 1996) was reviewed along with the land-use map (working draft) for the INTEC. This information was discussed with the infrastructure program representative to obtain the latest insight into anticipated future INTEC land-use needs. Program and facility representatives were contacted to obtain their outlook for anticipated long-range facility plans.

The final closure state of Building CPP-603 and configuration of a final cap/cover over the Building CPP-603 basins have not been determined. The closure of the Building CPP-603 basins is anticipated to include filling the basins with grout, leaving the basins and all underlying foundations in place.

Multiple active utility lines pass through Sites CPP-08/09 and CPP-10. Utilities were evaluated for each site in Appendix A of this report. These lines include fire water lines, process waste lines, high-pressure steam lines, and electrical duct banks. Many of the utilities enter Building CPP-603 in the same location as Sites CPP-08/09 and CPP-10. Where utilities enter or are adjacent to the buildings they support, they are considered to be part of the building.

2.1.4 CPP-08/09 and CPP-10 Recommendation

Sites CPP-08/09 and CPP-10 should be combined as one for Group 3 remediation (CPP-08/09/10). Contamination from these sites may extend beneath the east side of Building CPP-603 and beneath the CPP-603 basins. Multiple lines and utilities that support CPP-603 are present in the shallow (<20 ft bgs) soils of the site and enter the CPP-603 building there. The presence of these utilities provides further justification for recommending that remediation of portions of CPP-08/09/10 site be managed in a separate phase and coordinated with D&D&D of the CPP-603 building.

2.2 CPP-91 and Portions of CPP-36

2.2.1 Description of Site(s)

The Remedial Investigation/Feasibility Study (RI/FS) (DOE-ID 1997) was reviewed for information on Site CPP-91. This site consists of soil potentially contaminated by discharges from the drain at the base of a blower pit located on the north side of CPP-633 (Figure 2-2). The WCF blower pit was a concrete vault (13 ft 8 in. × 8 ft 11 in.) located just below ground surface. The blower pit contained a drain that was believed to discharge to the sediments approximately 10 ft below the blower pit floor, which was itself approximately 10 ft bgs. In 1992, a cleanup of the blower pit revealed elevated levels of contamination on the blower pit walls and floor. During the cleanup, water from rain and snowmelt entered the pit and was observed to be flowing into the blower pit drain. A release of radioactive contamination was presumed to have occurred through the blower pit drain to the environment.

The *Final Track 2 Summary Report for Operable Unit 3-08* (WINCO 1993) and the OU 3-13 ROD (DOE-ID 1999) were reviewed for Site CPP-36. The approximate area of contamination associated with this site is depicted by the rectangle shown in Figure 2-2. The southeast end of Site CPP-36 lies beneath CPP-633, and the northwest end abuts Structure CPP-708, the INTEC main stack. Site CPP-36 is described in the ROD as the result of three releases:

1. In 1970, the calciner off-gas lines between the WCF and the stack were excavated. Highly contaminated soil (up to 20 R/hr) was encountered at a depth of 6 ft beneath Olive Avenue. The exact location of the release source is unknown. The contaminated soil was excavated and disposed at the Radioactive Waste Management Complex (RWMC). "Clean fill" (<200 mrem/hr) was used as backfill.

2. In October 1974, contamination was encountered under Olive Avenue during excavation for installation of lines. This contamination apparently was the result of waste that flowed out of an orifice corroded by nitric acid. The waste was probably from liquids being transferred from Tank WC-119 (sump tank at the WCF) and Tank WC-102 (Process Equipment Waste [PEW] evaporator).

3. In November 1974, 750 gal of solution containing an estimated 4 Ci of total radiological activity leaked into Valve Pit MAH-OGF-P-04.

Based on the result of investigations conducted at Site CPP-36, the zone of contamination is assumed to extend from the ground surface to the soil/basalt interface at approximately 42 ft bgs. Site CPP-36 was extended to the southeast to incorporate Site CPP-91. Investigative results indicate contamination at Site CPP-91 to be indistinguishable from Site CPP-36.

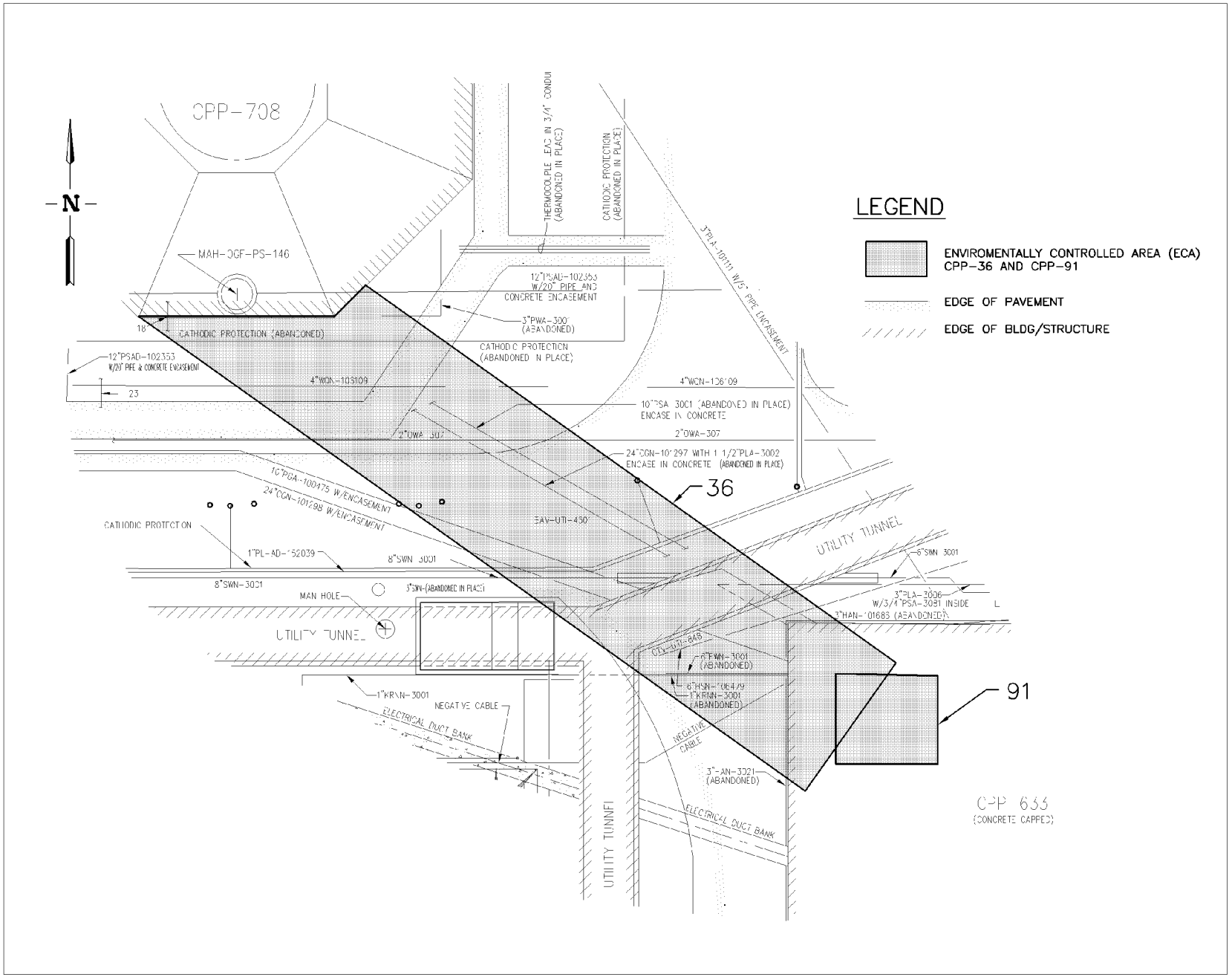


Figure 2-2. Environmentally controlled areas CPP-91 and CPP-36.

2.2.2 Site CPP-91 and CPP-36 Data Review

Site CPP-91: A 1992 sample of the 4 in. of dirt on the blower pit floor showed elevated levels of Cs-137 (2481 pCi/g), Cs-134 (50.1 pCi/g), Co-60 (57.8 pCi/g), Eu-154 (218 pCi/g), and mercury (0.19 mg/kg). As part of the RI, two borings (CPP-091-1 and CPP-091-2) were drilled to investigate the nature and extent of environmental contamination at CPP-91. Soil screening of the boreholes indicated the highest contamination 8,000 cpm at 17.5 to 20 ft bgs in CPP-091-1 and 10,000 cpm at 37.5 to 40 ft bgs in CPP-091-2. Cesium-137 was detected at activity levels up to 140 pCi/g, and the maximum Sr-90 activity was 7,580 pCi/g at a depth of 40 ft in boring CPP-91-2.

Site CPP-36: Based on the results of investigations conducted at Site CPP-36, the zone of contamination is assumed to extend from the ground surface to the soil/basalt interface at about 42 ft. Cs-137 and Sr-90 are the two major contaminants at Site CPP-36, with activities up to 4.05 E+05 pCi/g and 5.13 E+04 pCi/g respectively. Cs-137 was detected above background in 20 of 20 samples, and strontium-90 was detected above background in 19 of 20 samples. Low-activity cesium-137 contamination is widespread in the shallow soils and at least 20 times background were found in all soil samples analyzed. The "observation wells" show gamma radiation levels up to 11 mrem/hr in the uppermost 10 ft of soil. High-activity Cs-137 contamination is present at depths greater than 10 ft. The "observation wells" installed during the Track 2 investigation encountered radiation levels of 600 to 3700 mrem/hr at depths greater than 10 ft (WINCO 1993).

2.2.3 Status and Future of Building CPP-633 and Stack CPP-708

Building CPP-633, the WCF, housed several RCRA treatment, storage, and/or disposal units. The WCF was closed under a Hazardous Waste Management Act (HWMA) Closure Plan (LMITCO 1997). The entire WCF was grouted, and a concrete cap was installed over the building (now known as the Building CPP-633 monolith). The blower pit that the Site CPP-91 releases originated from was filled with grout, and the Building CPP-633 monolith overlies Site CPP-91 and a portion of Site CPP-36 as shown in Figure 2-2.

The northwest end of Site CPP-36 abuts the main stack (Structure CPP-708), as seen in Figure 2-2. It is anticipated that subsurface soil contamination extends below grade adjacent to and beneath the stack foundation. The future D&D&D date and end state of the stack have not been determined.

2.2.4 Site CPP-91 and CPP-36 Recommendation

It is recommended that remediating CPP-91 and the portion of CPP-36 that underlies the Building CPP-633 monolith be managed as a separate phase. The portion of Site CPP-36 soil contamination that underlies the main stack is also recommended to be managed as a separate phase.

3. SITE PRIORITIZATION AND GROUPING

This section describes the process used to group and prioritize the Group 3 sites for remediation. The process used for this activity was to develop criteria for use in the site evaluation, determine weights and apply the weights to the criteria, gather the specific data needed to evaluate the sites, and, finally, to evaluate the data against the criteria and score the sites based on the outcome of the evaluation. The resulting scores were then used to group the sites into remediation sets and establish the remediation priorities for the remediation sets. The groups identified by this process are referred to as remediation sets to avoid confusion with the WAG 3 CERCLA groups.

3.1 Approach and Process

This section discusses the approach to developing the criteria for prioritizing and grouping the sites and the data needed for ranking the sites against the criteria. The process used in this exercise to develop the evaluation criteria, group the sites, and prioritize the resulting remediation sets was developed from the value engineering (VE) process. The VE approach uses a structured, facilitated session that utilizes an interdisciplinary team to discuss and evaluate the proposed options. For this application, each of the proposed criteria was discussed and either modified or deleted as required in order to reach agreement from the team. Once the appropriate criteria were determined, the project team gathered data from the sites to support evaluation of the criteria. A second VE session was then held to determine the remediation sets and prioritize the sites based on the scores and the site data.

3.1.1 Development of Criteria

A VE session was used to formalize the criteria identification process. The VE session is a structured process used to brainstorm a solution to a given problem. In this case, an electronic decision support system, Criterium DecisionPlus® software, was utilized. Representatives on the interdisciplinary team were from Health and Safety, Construction, Systems Engineering, Project Management (BBWI and DOE), Project Engineering, and Environmental Affairs, as well as other technical personnel. A preliminary list of 10 criteria based on those typically used for prioritization of remedial sites at DOE facilities and other waste remediation sites was presented for consideration by the VE team.

During this session, the initial 10 criteria shown in Table 3-1 were evaluated by the interdisciplinary team and reduced to six relevant, measurable, and mutually exclusive criteria. Next, weighting factors were determined and applied to the criteria. Scoring measures or data needs were then determined for each criterion to enable ranking the sites. Additional details of the value engineering process are provided in Appendix B.

The process of evaluating the initial criteria included determining cases where the criteria may not be mutually exclusive. For example, for the initial criterion of "cost," it was determined that cost was a function of several of the other criteria including complexity, duration, contaminants at the site, and waste management issues, and therefore was not mutually exclusive. Other criteria were simply better defined. The criterion "schedule" was renamed "INTEC integration" and was defined as impact on operations and ongoing mission or project activities at INTEC. The initial criterion "milestones or legal requirements" was eliminated because there were no cases within the Group 3 soils that were affected by legal requirements or milestones. The final six mutually exclusive criteria and a brief description are provided below:

Table 3-1. Preliminary soils prioritization criteria and descriptions provided as a baseline at the value engineering session.

Criteria	Description
Worker Safety	The risk to workers conducting the remediation is driven by the internal hazards such as contamination levels present at the area; external hazards such as electrical utilities, high pressure lines, or other external hazards; the extent of labor or hands-on work required for the remediation; and the complexity of the remediation process.
Environmental Risk Reduction	The potential for reduction of environmental risk posed by remediation of the contaminated site.
Complexity	This includes the need for planning, startup measures, and coordination of interfaces and the degree of existing INTEC structures and utilities proximity to the remediation area.
Milestones/Legal Requirements	External milestones or legal requirements could drive the removal priorities. Sites where these milestones dictate the remediation schedule must be prioritized higher than those with no external or internal milestones or legal requirements.
Costs	Cost is directly tied to duration, complexity, and other factors and, therefore, is not a mutually exclusive criterion. Although available funding may impact the amount of remediation to be performed during a specific time period, the team determined that "cost" was not mutually exclusive; therefore, it would not be considered as a standalone criterion.
Planned Use of Site	Consideration of possible planned uses of the site can dictate priorities for remediation. Sites having an identified planned use may be considered for remediation sooner than those that have no anticipated or identified planned use. This criterion could be associated with internal or external milestones.
Waste Treatment/ Disposal Issues	Treatment/disposal issues should be identified that may add complexity to the remediation task. Grouping of the sites with similar treatment and disposal operations will reduce treatment and disposal startup measures.
Duration	The time required to complete the removal project. Several shorter-duration projects could be completed in a similar time frame as one long-duration project. It may be desirable to remediate short-duration projects first.
Contaminant Risk	Removal efficiencies may be considered in the prioritization effort. Sites where removal efficiencies are well defined and confidence is high should be remediated ahead of those sites where poor efficiencies are anticipated. This approach will allow some removals to proceed earlier than others that may benefit by additional research, experience, or planning.
Schedule	Schedule coordination with other projects at INTEC could be important in the prioritization of the remediation. Those sites with known schedule conflicts or that may be difficult to coordinate with existing schedules may be delayed until conflicts are resolved.

1. **Planned Use of Site** - Consideration of possible planned uses of the site not currently in operation, including coordination with D&D&D. Sites having an identified planned use may be considered for remediation sooner than those that have no anticipated or identified planned use. This criterion could be associated with internal or external milestones.

2. **Environmental Risk Reduction** - The potential for reduction of environmental risk (i.e., groundwater and surface) posed by the contaminated site including potential for contaminant migration via all pathways.

3. **INTEC Facility Infrastructure** - Site accessibility including existing INTEC structures and utilities within the proximity of the remediation area.

4. **Complexity of Worker Controls** - Degree of necessary controls due to toxicity of materials, concentration of contaminant, and physical hazards (e.g., radiological, industrial hygiene, construction, or other controls).

5. **Waste Management** - Sites that will require additional handling prior to disposal (based on ICDF landfill Waste Acceptance Criteria [WAC] requirements).

6. **INTEC Integration** - Impact on day-to-day operations/ongoing mission or project activities.

3.1.2 Weighting the Criteria

A Paired Comparison technique was used to assign weights to the six criteria. Paired Comparison analysis relies on the consensus of the team to evaluate the importance of each criterion relative to the others. Based on the analysis, the Criterium DecisionPlus® software calculates a weight factor for each criterion. This process is particularly useful in applications such as this, where priorities are not clear or are competing in importance. The weighting scores assigned by the software are based on the following definitions:

1 – No Difference	6 – Strongly More Important
2 – Barely More Important	7 – Very Strongly More Important
3 – Weakly More Important	8 - Critically More Important
4 – Moderately More Important	9 - Absolutely More Important
5 – Definitely More Important	

The team considered each of the six criteria and team consensus was obtained to determine the relative importance of each criterion, and the rankings were applied for the paired comparison (Appendix B). Although the purpose of Group 3 remedial activities is to remove high-risk soils and materials that are not under buildings and to place them in a lower-risk configuration, such as the ICDF, "Environmental Risk Reduction" was the second most important criterion (Table 3-2). This can be explained by examining the rational that the team used. From the team's perspective, it is very important to clean up the Group 3 sites so other programs can continue or new ones begin. Their viewpoint was that "Planned Use of Site" is only weakly (3) more important than "Environmental Risk Reduction," but that "Planned Use of Site" is more important (5 or 6) against all the other criteria. The criterion "Environmental Risk Reduction" was also more important (5 or 6) against all the other criteria.

Table 3-2. Weights and scoring measures assigned to the six criteria.

Criterion	Weight	Score	Description
Planned Use of Site	0.401	1-3	No identified use
		4-7	Long-term uses planned from 11 to 25 years
		8-10	Planned use identified within next 10 years
Environmental Risk Reduction	0.299	1-3	Low concentration ratio of OU 3-13 ROD contaminants of concern (COCs) compared to the total contaminant(s)
		4-7	Medium concentration ratio of OU 3-13 ROD COCs compared to the total contaminant(s)
		8-10	High concentration ratio of OU 3-13 ROD COCs compared to the total contaminant(s)
INTEC Facility Infrastructure	0.137	1-3	Greater than 30 obstructions/interferences in the area
		4-5	Greater than 21 obstructions/interferences and less than 30 in the area
		6-7	Greater than three obstructions/interferences and less than 20 in the area
		8-10	Three or fewer obstructions/interferences in the area
Complexity of Worker Controls	0.085	1-3	Anticipated at or above the exposure limit or high radiological (>5 rem at 1 ft) or significant engineering or administrative controls required
		4-5	Anticipated in excess of action limits but less than exposure limits and special controls required (i.e., the radiological controls)
		6-7	Anticipated below action level, but special controls required
		8-10	Anticipated below action levels for radiological and nonradiological contaminants and no special controls required
Waste Management	0.051	1-3	Waste known to require additional waste management
		4-5	Sites suspected to have large quantities of waste requiring additional management
		6-7	Sites with potential for minimal additional waste management
		8-10	No identified waste management issues (soil only site)
INTEC Integration	0.027	1-3	High traffic area or ongoing operations in this area
		4-7	Moderate traffic or intermittent operations
		8-10	No ongoing operations in this area

An example is the remediation of Sites CPP-92, CPP-98, and CPP-99. The soil boxes stored at these sites should be removed in the not-too-distant future to enable subsequent temporary storage of soil boxes generated during future remediation activities or other programs. In addition, remediation of Site CPP-97 would enable future programs to use the land at that site.

During the weighting process, team consensus was measured by the consistency ratio index. This value indicates the overall consistency of the ranking, with a lower value indicating a greater degree of consistency. The ratio for this analysis was 0.147, which is close to the goal of 0.10, indicating relative consistency among the paired comparison factors. Some minor inconsistency was measured as expected; but, had there been higher levels of inconsistency, the comparisons would have been reconsidered to ensure reliable results.

3.1.3 Scoring Measures

The group determined scoring measures for each criterion using a 10-point scale generally grouped into high (8-10), medium (4-7), and low (1-3) scoring measures. These scoring measures defined the data needs for the criteria as well as enabled ranking of the site for each criterion. For example, the criterion "planned use of the site" was given the scoring measures of score = 1-3, no identified planned use; 4-7, long-term uses planned from 11-25 years; and 8-10, planned use identified within the next 10 years. The data collected for each site determined how the site scored. A higher score indicates a more favorable or higher priority for removal. Table 3-2 shows the scoring measures that were assigned to the six criteria.

3.1.4 Data Review

The scoring measures or site data necessary for each criterion were gathered and reviewed for each site to enable ranking the soil remediation sites against the criteria. Calculations were performed, as needed, to derive additional information. Details of the data compilation are found in Appendix A. The data for each site included the following:

- Planned Use of Site

  Reviewing the CFLUP, D&D&D plans, and the Long-Range Plan for planned land-use needs.

  The CFLUP was reviewed along with the land-use map (working draft) for INTEC. This information was then discussed with the infrastructure program representative to obtain the latest insight into anticipated planned INTEC land-use needs. The D&D&D Project Summary Report (INEEL 2001) was reviewed and discussed with D&D&D program representatives who are knowledgeable about planned and anticipated INTEC D&D&D activities for the next 10 years. Program and facility representatives were contacted to obtain their outlook for anticipated long-range facility plans.

- Environmental Risk Reduction

  Developing site-specific contaminant mass and the weighted average contributions for each site from the "INEEL CERCLA Disposal Facility Design Inventory" (EDF-ER-264).

  The contaminants of concern (COCs) and the soil risk-based remediation goals for the Group 3 soil sites are identified in the OU 3-13 ROD. These COCs include Am-241, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240, Pu-241, Sr-90, and mercury. The expected maximum concentrations of these COCs for each Group 3 site were taken from the "ICDF Design Inventory," EDF-ER-264. To rank each of these sites in terms of environmental risk, two calculations were performed. First, the COC

concentrations were compared to the remediation goals from the ROD. Second, the mass of each COC for each site was divided by the sum of that COC for all of the Group 3 sites (see Appendix C). Using this methodology, the environmental risk for each site could be compared to the other sites by knowing how many times a COC exceeded the remediation goals for a site and knowing what percentage of a COC was associated with an individual site.

- INTEC Facility Infrastructure

  Reviewing facility and underground drawings, and a site walk-down to confirm access issues.

  The information reviewed for this task included INTEC underground utility drawings obtained from the document control system on the INEEL intranet. From these, the underground utility systems located at each site were identified. Walk-downs of each site were also conducted to determine the accessibility for excavation. Both overhead and nearby visible obstructions were noted.

- Complexity of Worker Controls

  Determining hazards from external/internal radiation and chemical contaminants from contaminant concentration data in "ICDF Design Radiological Control Analysis" (Draft Title II) (EDF-ER-326) and EDF-ER-264. Physical hazards from personal observations of each site (i.e., live wires, etc.) were identified.

  The risk to workers conducting remediation activities is driven by the contamination levels; external hazards, such as electrical utilities, high-pressure lines, or other external hazards; the extent of labor or hands-on work (e.g., amount of infrastructure that will interfere with excavation); and the complexity of the remediation process. Radionuclide contaminant concentration data were obtained from EDF-ER-326 on Cs-137 to determine the hazards from external radiation and on Pu-238 for internal radiation hazards. Hazards from organic/inorganic contaminants were based on concentration data from EDF-ER-264. Physical hazards were determined from personal observations made at each soil site location, descriptions in the WAG 3 ROD, and data gathered from engineered drawings (see Appendix D).

- Waste Management

  Reviewing the draft Waste Approval Forms (WAFs) and site descriptions in the WAG 3 ROD.

  Data sources reviewed to identify potential Group 3 soil waste management issues consisted of the draft WAFs in the "ICDF Complex Approved Waste Streams," (DOE-ID 2002a) and the site descriptions in the WAG 3 ROD (DOE-ID 1999). The WAFs compare expected site contaminants with the ICDF landfill WAC (DOE-ID 2002b). While additional higher-tier sampling and validation for some sites may be needed to verify that the wastes are within the WAC limits, there were no wastes identified that exceeded the ICDF landfill WAC.

  The Group 3 soil site descriptions were reviewed in relation to the description in the ROD and the WAFs to assist in identifying any unique waste such as debris, piping, etc. that may require additional management due to void space or other unusual conditions. In addition, the waste management applicable or relevant and appropriate requirements (ARARs) for Group 3 soils (DOE-ID 1999, Table 12-3) were also reviewed to identify Group 3 sites that will require meeting land disposal restrictions (LDRs) (i.e., CPP-92, CPP-97, CPP- 98, CPP-99, or soils that have triggered placement). The assumption made for the prioritization effort is that Group 3 wastes generated during the remediation of the sites (with the exception of CPP-92, CPP-97, CPP-98, and

CPP-99) will be transferred directly from the remediation activity to the ICDF for disposal and alternative treatment standards for LDRs apply. (DOE-ID 1999, Table 12-3)

- INTEC Integration

  Reviewing near-term schedules for INTEC Operations/Projects.

  The 5-year plan for INEEL projects was reviewed and representatives from INTEC Operations/Projects, such as those involved with facility and maintenance management, the tank farm, and the High-Level Waste Program, were contacted to determine the outlook for near-term activities at INTEC.

3.2 Site Prioritization

This section describes the process for prioritizing each of the sites for remediation based on their ranking, how they are grouped, and the proposed order of remediation. The activity was accomplished during a second VE session following the major data-gathering effort. This VE session was tailored to determine the final outcome of the results, based on the criteria and the site data, thereby establishing the recommended prioritization for remediation of the sites.

3.2.1 Site Ranking

Subject matter experts (SMEs) from the WAG 3 project team used the data described in Section 3.1 to evaluate and score each site. This preliminary scoring activity was done independently for each of the six criteria. The resulting scores were compiled and presented to the interdisciplinary team for consideration as a baseline score during the second VE session. (See Appendix A for the presentation slides from the VE session.)

During the second VE session, the team reviewed each of the 29 sites and the criteria for each site. Then, using the proposed score as a baseline, each team member scored the site for each of the six criteria. The team was encouraged to score the sites independently based on (1) knowledge and experience, (2) the group discussion of each criterion, and (3) the baseline score provided by the SME. In cases where the individual score provided by the team member was sufficiently different from the baseline score to effect a change in the score category, an explanation for the score deviation was required. For example, if a baseline score of three were given on a particular site, indicating no anticipated planned use for the site, and a team member was aware of a potential use within the next 12 years, the individual would score the site a 4, 5, or 6 and note the explanation for the change of categories. The distribution of the votes and associated comments for each criterion on all the sites are given in Appendix E (Table E-1).

Scores were captured, weighted, and calculated using the group system software. Team consensus was measured and evaluated periodically throughout the process. Adjustments were made to the scoring when necessary due to keyboard or perception errors. Where scoring was legitimately spread on a given criterion, the data were flagged (see red cells on Table 3-3) to indicate general lack of consensus among the team. Table 3-3 illustrates the results of the scoring for each site and each criterion. The color of the cell indicates the level of consensus of the scores within the cell. Green cells indicate a high level of consensus and a red cell indicates a low level of consensus.

Table 3-3. Results matrix. (Green cells – high level of consensus; red cells – low level of consensus)

Remediation Sites	Planned Use of Site	Environmental Risk Reduction	INTEC Facility Infrastructure	Complexity of Worker Controls	Waste Management	INTEC Integration	Total	Mean	STD	Weighted Total
Weight	2.41	1.79	0.82	0.51	0.31	0.16				
1.CPP-01/04/05	2.00	8.27	7.27	3.36	5.09	7.73	33.73	5.62	2.56	30.12
2.CPP-03	1.64	4.00	8.00	8.18	8.36	7.45	37.64	6.27	2.79	25.62
4.CPP-08	2.27	5.00	5.91	4.91	5.55	7.27	30.91	5.15	1.65	24.66
5.CPP-09	1.91	5.00	2.55	3.18	5.18	7.27	25.09	4.18	2.00	20.03
6.CPP-10	2.45	5.00	3.45	3.18	6.45	6.82	27.36	4.56	1.81	22.41
7.CPP-11	1.91	5.45	4.64	4.82	3.64	7.36	27.82	4.64	1.82	22.93
8.CPP-13	1.18	6.00	7.82	6.09	8.27	6.82	36.18	6.03	2.54	26.76
9.CPP-14	2.64	1.27	2.18	5.18	4.55	4.91	20.73	3.45	1.63	15.26
10.CPP-19	1.27	9.00	7.45	2.64	4.91	6.91	32.18	5.36	2.98	29.26
11.CPP-34A & 34B	1.00	5.00	8.36	8.27	7.36	9.36	39.36	6.56	3.10	26.22
13.CPP-35	1.00	6.00	4.00	4.00	5.45	7.18	27.64	4.61	2.15	21.31
14.CPP-36	1.09	9.91	2.91	1.00	5.64	2.82	23.36	3.89	3.39	25.46
15.CPP-37a	1.00	1.00	9.73	9.00	8.36	9.91	39.00	6.50	4.30	20.94
16.CPP-37b	7.91	4.55	8.36	5.91	3.27	8.91	38.91	6.48	2.27	39.51
17.CPP-37c	6.64	3.55	7.00	8.45	4.36	8.64	38.64	6.44	2.09	35.13
18.CPP-41a	1.82	1.09	5.18	6.27	7.45	6.27	28.09	4.68	2.61	17.10
19.CPP-44	1.10	1.00	9.30	7.30	8.30	7.10	34.10	5.68	3.67	19.50
20.CPP-48	1.00	3.90	8.90	8.00	7.10	6.80	35.70	5.95	2.95	24.06
21.CPP-55	1.73	1.00	7.64	6.82	7.64	8.36	33.18	5.53	3.27	19.40
22.CPP-67	1.09	6.55	8.09	7.64	7.73	9.64	40.73	6.79	2.96	28.81
23.CPP-68	1.82	1.09	6.91	7.91	8.27	6.09	32.09	5.35	3.12	19.57
24.CPP-91	1.00	9.00	1.36	2.18	7.36	4.73	25.64	4.27	3.34	23.79
25.CPP-92	8.55	5.73	9.36	8.00	3.45	8.27	43.36	7.23	2.21	45.00
26.CPP-93	1.00	6.00	5.73	7.82	7.09	7.09	34.73	5.79	2.47	25.17
27.CPP-97	9.64	4.64	8.73	8.91	6.27	9.36	47.55	7.92	2.01	46.67
28.CPP-98	8.56	5.11	9.44	8.22	3.20	7.33	41.87	6.98	2.37	43.87
29.CPP-99	8.67	5.11	9.56	8.22	3.20	7.78	42.53	7.09	2.42	44.30
Total	82.87	134.21	188.84	173.47	170.53	207.69				
Mean	2.96	4.79	6.74	6.20	6.09	7.42				
STD	2.92	2.50	2.52	2.34	1.77	1.59				

The table below (Table 3-4) shows the distribution of the unweighted scores for each site and the total score prior to applying the weights to each criterion. In Table 3-5, the weights are applied to provide a final score for each site. Because the scoring criteria were based on a scale of 1-10, 10 being the most important for removal, sites with higher overall scores will have a higher remediation priority. The highest weighting was applied to sites with a planned use identified in the next 10 years. Those sites (CPP-97, CPP-92, CPP-99, and CPP-98) that carried high scores in planned use as well as in other criteria are the top-priority removal sites. Note that these same four sites also scored highest prior to applying the weightings to the criteria.

Table 3-4. Scores prior to application of the weights.

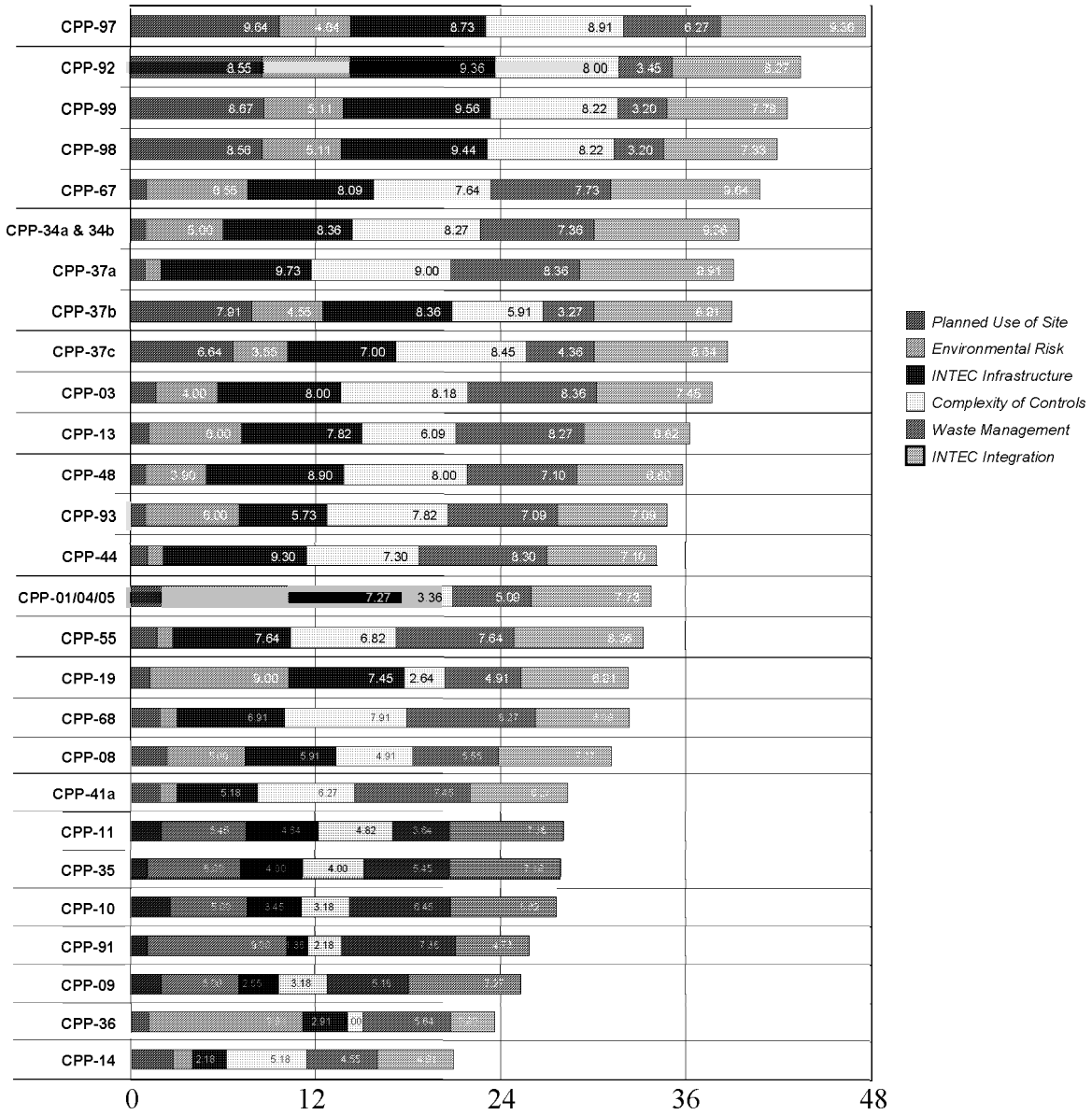
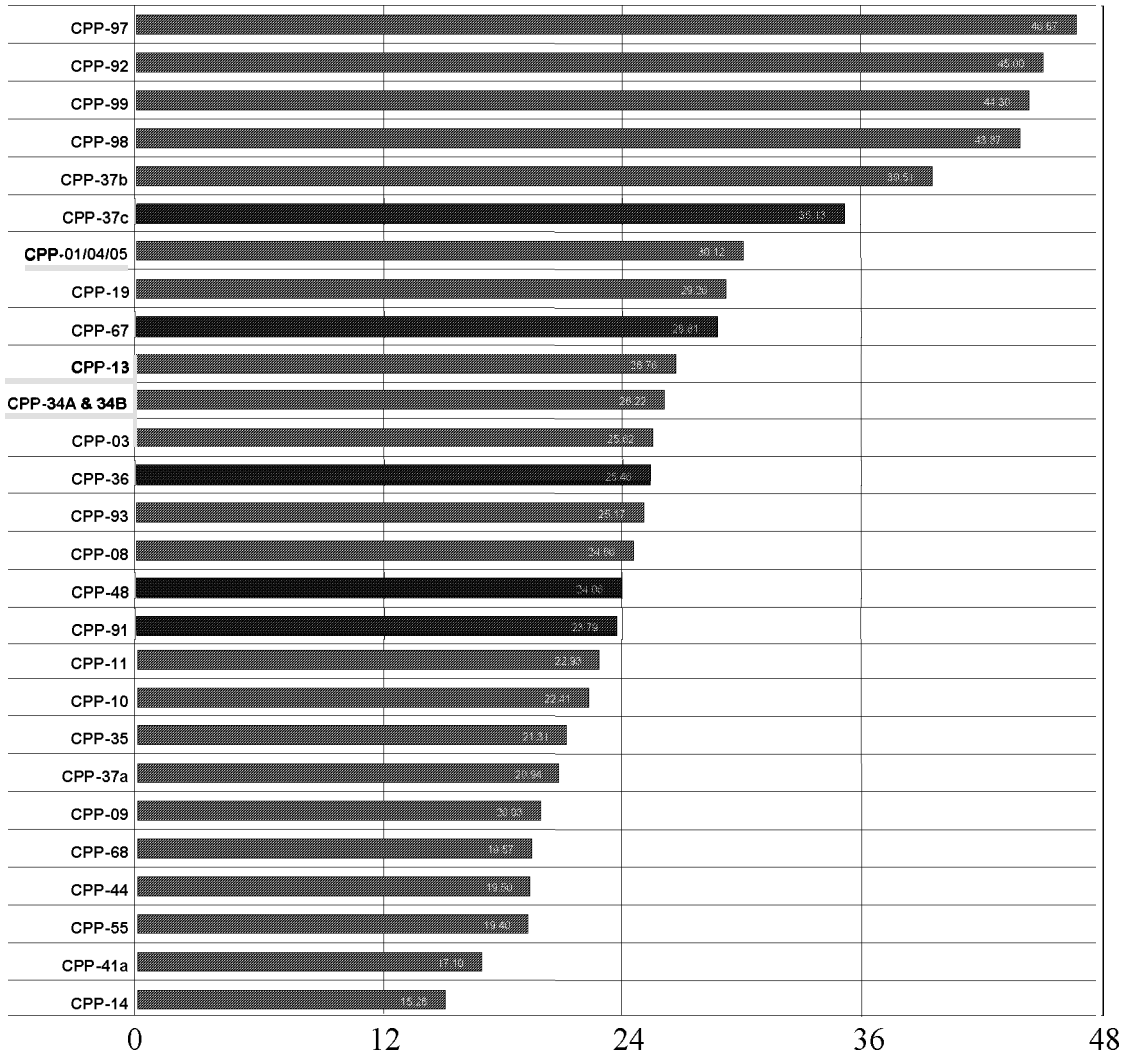


Table 3-5. Overall weighted scores.



3.2.2 Grouping by Prioritization

Using the weighted scoring totals and other criteria, the sites were grouped into six remediation sets. The groups identified in this process are referred to as remediation sets to avoid confusion with the WAG 3 CERCLA groups. The scores in Table 3-5 were a starting point for determining the six remediation sets and their priority.

The highest-priority remediation set identified in Table 3-5 was CPP-97, CPP-92, CPP-99, and CPP-98 in order of highest priority. It was determined by team consensus that because these sites had a clear planned use in the next 10 years, they would be retained as the top priority for remediation. Note that these same four sites scored highest (see Tables 3-4 and 3-5) prior to applying the weightings to the criteria, indicating that they had the highest overall score on all criteria.

The next set that resulted from the scoring were CPP-37B and CPP-37C in order of highest priority. These sites scored high in potential planned use, but scored somewhat lower in other criteria such as "complexity of worker controls" and "environmental risk reduction," moving this set into the second priority for retrieval. These sites in Table 3-5 follow the first remediation set.

The remainder of the sites had less distinct differences in scoring, as seen on Table 3-5. There were not strong obvious differences in the overall scores for these sites; other factors, such as proximity and similarity of site features, were used by the team to determine the remaining remediation sets.

The third-priority remediation set was the easily accessible sites with a moderate level of environmental risk reduction such as CPP-34A and 34B, soil storage areas; CPP-67, Percolation Ponds 1 and 2; and CPP-37A, a large gravel pit located outside the INTEC fence. These sites also had higher scores in several of the other lower-weighted criteria such as complexity of controls, INTEC integration, and INTEC facility infrastructure.

The fourth-priority remediation set is the sites east of CPP-603 with significant environmental risk reduction potential. Sites CPP-01/04/05 are all in the same area and have similar remediation issues. Sites CPP-08, CPP-09, CPP-10, CPP-11, and CPP-19 were included in this group because of the proximity in location of the sites and similarity in remediation issues. As shown in Table 3-5, Sites CPP-01/04/05 and CPP-19 are ranked directly below Sites CPP-37b and CPP-37c. Section 2 presents an evaluation for combining Sites CPP-08, CPP-09, and CPP-10 and managing portions of the combined sites with Group 2, Soils Under Buildings.

The fifth remediation set is comprised of those sites in proximity to the WCF with high environmental risk reduction but significant INTEC coordination issues. This set includes Sites CPP-13, CPP-36, CPP-93, CPP-48, CPP-91, and CPP-35. These sites will likely be the most difficult to remediate due to the significant underground obstructions in the area. Additionally, the area where these sites are located is the most congested area at the INTEC facility. Section 2 presents an evaluation for combining portions of Site CPP-36 with CPP-91 and managing this area with Group 2, Soils Under Buildings.

The last set is made up of the five sites with the lowest remediation priority. These sites are CPP-14, CPP-68, CPP-44, CPP-55, and CPP-41a in order of descending priority. As shown in Table 3-5, these sites are ranked last. These are generally small sites in areas with no planned use, having very low environmental risk, and, in most instances, in areas with significant infrastructure issues. Shown below are the resulting remediation sets and the priorities for remediation.

3.2.2.1 Remediation Set 1 – Sites with Planned Use Potential Within 10 Years

- CPP-97, Tank Farm Soil Stock Pile
- CPP-92, Soil Boxes West of CPP-1617
- CPP-99, Boxed Soil
- CPP-98, Tank Farm Shoring Boxes.

3.2.2.2 Remediation Set 2 – Sites with Planned Use Potential Beyond 10 Years

- CPP-37B, Gravel Pit and Debris Landfill Inside INTEC Fence
- CPP-37C, Contamination Discovered Southeast of CERCLA Site CPP-37b.

3.2.2.3 Remediation Set 3 – Easily Accessible Sites with Moderate Environmental Risk Reduction

- CPP-03, Temporary Storage Area Southeast of CPP-603
- CPP-37A, Gravel Pit Outside INTEC Fence
- CPP-67, Percolation Ponds 1 and 2
- CPP-34A, Soil Storage Area (Disposal Trenches) in the Northeast Corner of INTEC
- CPP-34B, Soil Storage Area (Disposal Trenches) in the Northeast Corner of INTEC.

3.2.2.4 Remediation Set 4 – Sites East of CPP-603 with Significant Environmental Risk Reduction

- CPP-01, Concrete Settling Basins and Dry Wells East of CPP-603
- CPP-04 & CPP-05, Contaminated Soil Area Around CPP-603 Settling Tank and Settling Basin
- CPP-08, CPP-603 Basin Filter System Line Failure
- CPP-09, Soil Contamination at Northeast Corner of CPP-603 South Basin
- CPP-10, CPP-603 Plastic Pipeline Break
- CPP-11, CPP-603 Sludge and Water Release
- CPP-19, CPP-603 to CPP-604 Line Leak.

3.2.2.5 Remediation Set 5 – Sites in the WCF Area with High Environmental Risk Reduction But Significant INTEC Coordination Issues

- CPP-91, CPP-633 Blower Pit Drain
- CPP-36, Transfer Line Leak from CPP-633
- CPP-35, CPP 633 Decontamination Spill
- CPP-48, French Drain South of CPP-633
- CPP-93, Simulated Calcine Disposal Trench
- CPP-13, Pressurization of Solid Storage Cyclone Northeast of CPP-633.

3.2.2.6 Remediation Set 6 – Sites with No Planned Anticipated Use and Minimal Environmental Risk Reduction

- CPP-14, Old Sewage Treatment Plant West of CPP-664
- CPP-68, Abandoned Gasoline Tank CPP VES-UTI-652 (North of CPP-606)
- CPP-44, Grease Pit South of CPP-608
- CPP-55, Mercury-Contaminated Area South of CPP T-15
- CPP-41A, Fire Training Pits Between CPP-666 and CPP-663, Under Asphalt.

3.2.3 Special Case Regarding Grouping or Reprioritization

During the remediation process, some sites that may be "low priority" may get rescheduled to be remediated sooner based on factors such as funding. For example, an "easy" or low-cost site may be scheduled for a year when sufficient funding is not available to remediate a higher priority site that is "complex" or has a higher cost to remediate. These determinations will be made as the remediation process progresses.

4. CAPPING EVALUATION

The OU 3-13 Feasibility Study (FS) (DOE-ID 1997) examined the following four alternatives for remediation of Group 3 soils as a whole. The four alternatives that were evaluated are briefly described below:

- Alternative 1 was comprised of existing institutional controls currently implemented at the site. No active remediation will be performed under this alternative to alter the existing site conditions. The existing institutional controls include site access restrictions, radiation surveys, air monitoring, and maintenance. These controls would remain in place until 2095.

- Alternative 2 included the existing institutional controls described for Alternative 1 and additional institutional controls to control exposures to contaminated soils. The additional institutional controls included land and/or regulatory restrictions, such as land use restrictions, to prevent inadvertent exposure to contaminants.

- Alternative 3 included existing and additional institutional controls described for Alternative 2 and containment in place (capping) or each individual site using an engineered barrier. The engineered barrier would be subject to operation and maintenance activities and 5-year reviews under CERCLA as long as an unacceptable risk remained at each site. Some of the operating facilities would interfere with cap construction, so final remediation could not be implemented until facility D&D&D has concluded.

- Alternative 4A included the existing institutional controls described in Alternative 1 and removal and on-Site disposal of the contaminated soils at each release site in this group. The excavated soils would be deposited in the ICDF.

- Alternative 4B was identical to Alternative 4A except that disposal in an off-Site facility was evaluated.

This section re-evaluates the alternatives of capping individual sites in place (Alternative 3) and removal and on-Site disposal (Alternative 4A). This section summarizes the capping evaluation that was performed as part of the FS and re-examines this approach for individual sites. This evaluation addresses

- Risk reduction

- Long-term operation, maintenance, and monitoring

- Implementability

- Footprint reduction

- Cost.

Soils extending under buildings or structures may qualify for capping versus excavation based on planned (pre-2095) and future (post-2095) use expectations for the area.

4.1 Risk Reduction

The capping alternative was determined in the OU 3-13 FS (DOE-ID 1997) to provide somewhat less long-term effectiveness for Group 3 soils than the excavation and on-Site disposal alternative. Excavation and on-Site disposal reduces the risk footprint of the Group 3 soils. Therefore, excavation and on-Site disposal in the ICDF was selected as the remedy for Group 3 soils.

4.2 Long-Term Operation, Maintenance, and Monitoring

Institutional controls need to be maintained for all sites until they are excavated or capped. Following excavation, most Group 3 sites would require only administrative controls, such as deed restrictions, if contamination remained at depth below 10 ft, or no institutional controls if no contamination remained.

If a cap were installed, each cap would require active institutional controls such as public access restriction and/or fencing, cap inspection for problems such as cap deterioration, and maintenance of identified problems. It is assumed that each individual cap would require a groundwater monitoring program. Each groundwater monitoring program would consist of eight monitoring wells (i.e., four aquifer wells and four perched wells). One perched and one aquifer well would be located upstream of each site and three perched and three aquifer wells would be downstream from each site. The length of time groundwater monitoring and cap inspection/maintenance would be required has not been determined. Therefore, the costs of inspection and monitoring for an assumed period of 100 years are included in the cost evaluation in Section 4.5.

4.3 Implementability

An engineered cap, similar to the cover of the ICDF landfill, cannot be installed over most of the Group 3 sites without interfering with INTEC operations. Installation of a cap over each site would involve removing surface structures overlying the site or incorporating the structure (such as the Building CPP-633 monolith) into the cap design. Based on the ICDF cap, individual caps would be approximately 17 ft thick. Waiting until portions of INTEC are shut down, buildings have undergone D&D&D, and existing roadways are no longer needed would be required before individual site caps could be designed and installed. Due to this need for integration with an active facility, installing caps over Group 3 sites would cause an indefinite delay in remediation of these sites.

4.4 Footprint Reduction

Excavation of Group 3 sites and backfilling of the excavations with clean fill will eliminate the need for institutional controls for the majority of these sites.

Consolidation of the Group 3 soils into the ICDF reduces the inspection and maintenance requirements to one large cap instead of several small caps and reduces the groundwater monitoring requirements to one program instead of multiple programs.

4.5 Capping Versus Excavation Cost Evaluation

At the time the FS was performed, capping was evaluated as less expensive than excavation and on-Site disposal. A new cost estimate (Appendix F) has been prepared which compares capping costs to excavation and on-Site disposal costs for a generic 200-ft by 200-ft area near Site CPP-37. Capping costs

include installation of monitoring wells and institutional controls until 2095. Remediation costs include excavation, hauling, disposal to ICDF, and backfilling the excavation with clean fill.

The cost estimate made the following assumptions:

- For the cap, groundwater monitoring is performed on eight wells (four perched water wells and four aquifer wells) twice per year for the first 5 years and once every 5 years for the following years up to the year 2095.
- Cap construction was based on the documented costs of the ICDF cap.
- For the excavation estimate, no dump fees were assumed at the ICDF.
- For the excavation estimate, the site hole will be backfilled with material from the ICDF stockpile.

The total estimated cost for capping the generic site was $2,250,000, and the total estimated cost for excavation and disposal to the ICDF for the same site was $940,000.

4.6 Conclusions and Recommendations

Installing individual caps is not cost-effective and does not add to risk reduction efforts. Therefore, this evaluation confirms that the approach identified in the OU 3-13 FS for the Group 3 sites is appropriate, except for portions that extend under buildings or structures discussed in Section 2.

5. COST EVALUATION OF ON-SITE VERSUS OFF-SITE DISPOSAL

Cost estimates for both on-Site and off-Site disposal alternatives were initially developed in the OU 3-13 Feasibility Study Supplement Report (DOE-ID 1998a). This information was presented in the OU 3-13 Proposed Plan (DOE-ID 1998b) and comments pertaining to disposal costs were considered in the development of the OU 3-13 ROD (DOE-ID 1999). Since this analysis was conducted several elements have changed: volume and characteristics of the various waste streams destined for the ICDF landfill; layout and configuration of the ICDF Complex facilities; General Accounting Office reports on low-level waste; and requirements specified in the OU 3-13 ROD. The estimated costs were then reevaluated for (1) on-Site disposal at the ICDF and (2) off-Site disposal at a commercial disposal facility (see Appendix G, On-Site Versus Off-Site Soil and Debris Disposal Comparison for the ICDF Complex).

The October 2001 reevaluation includes the waste streams from the Group 3 release sites and D&D&D projects being considered for disposal in the ICDF. Presented are the current waste classifications, updated waste volumes for each waste type, and the summary cost estimates for on-Site disposal using the ICDF Complex and off-Site disposal at a commercial disposal facility. Comparisons of the estimated disposal costs are made between the two options for waste disposal. These revised costs are also compared to the previous on-Site and off-Site costs presented in the OU 3-13 FS Supplement Report (DOE-ID 1998a) (see Appendix G).

The cost estimate for on-Site disposal at the ICDF is based on the ICDF 30% design (DOE-ID 2001b), the SSSTF RD/RA WP (DOE-ID 2002c), and the projects being implemented for the ICDF Complex and their associated cost estimates. Major components of the ICDF Complex include (1) road work, (2) utilities, (3) administration facility, (4) scales facility, (5) decontamination facility, (6) treatment equipment, (7) ICDF landfill cells with a 510,000-yd^3 capacity, (8) ICDF evaporation pond, and (9) a waste tracking system. The scope of these is discussed in Section 4 of Appendix G.

The major changes between the FS Supplement and the 30% design stage for the on-Site disposal option are

- Reduction in the number of disposal cells from six to two cells, resulting in significant decreases in construction costs
- Reduction in landfill footprint requiring engineering barrier (cap) over the disposal cells, resulting in significant reduction in closure costs
- Increased design, RAWP, equipment, and startup costs for the on-Site disposal alternative over the FS Supplement estimate
- Reduction in operations cost between the FS Supplement and 30% design estimate due to the work being considered for INEEL personnel versus subcontract personnel, as presented in the FS Supplement estimate.

The major changes between FS Supplement and 2001 estimate for off-Site disposal are

- Increased design, RAWP, equipment, and startup costs for the off-Site disposal alternative over the FS Supplement estimate
- Major reductions in operations cost between the FS Supplement and 2001 estimate due to the work being considered for INEEL personnel versus subcontract personnel, as presented in FS Supplement estimate

- Increased cost for closure of the off-Site loadout facilities between the FS Supplement and 2001 estimate.

Summary cost estimates for the major cost elements of on-Site disposal at the ICDF are shown in Table 5-1. The scope of the major cost elements is presented in Section 4 of Appendix G. Details concerning the major cost elements, sub-elements, and assumptions used to develop the cost estimate are also presented in Appendix G. This information is described in Appendix C, On-Site Disposal Cost Estimate, of Appendix G.

Table 5-1. Summary cost estimate for on-Site disposal at the ICDF Complex.

Cost Elements	Current Cost Estimate (2001 dollars)
Capital	
Design	$8,451,000
Construction	$23,176,000
Operations total	$21,486,000
Closure total	$9,969,000
Postclosure total	$7,995,000
Other cost total	$8,550,000
Grand total	$79,627,000

The cost estimate for off-Site disposal is provided in Table 5-2. Where several of the issues and functions necessary for handling waste are applicable to either on- or off-Site disposal, the information and cost estimates from the on-Site disposal project were used along with other assumptions to develop the off-Site disposal cost estimate. Major components of an off-Site shipping facility include (1) road work, (2) utilities, (3) administration facility, (4) scales facility, (5) decontamination facility, (6) railroad spur, and (7) a waste tracking system. The scope of these is discussed in Section 5 of Appendix G.

The off-Site disposal facility summary cost estimate for the major cost elements is also shown in Table 5-2. The scope of the major cost elements is presented in Section 5 of Appendix G. Details concerning the major cost elements, sub-elements, and assumptions used to develop the cost estimate are presented in Appendix G. This information is described in Appendix E, Off-Site Disposal Cost Estimate, of Appendix G.

Table 5-2. Summary cost estimate for off-Site disposal.

Cost Elements	Current Cost Estimate (2001 dollars)
Capital	
Design	$1,271,000
Construction	$7,843,000
Operations total	$449,617,000
Closure total	$1,744,000
Postclosure total	$0
Other cost total	$4,500,000
Grand total	$464,975,000

Comparison of the estimated costs for the on-Site disposal at the ICDF, off-Site disposal, and the costs presented in the OU 3-13 FS Supplement (DOE-ID 1998a) are presented in Table 5-3 (also see Section 6 in Appendix G of this report). These values include all costs associated with the five major cost elements (see Sections 4 and 5 of Appendix G). The costs for both on-Site and off-Site have been significantly reduced since the OU 3-13 FS Supplement costs were determined. On-Site disposal is estimated to be less than one-fifth the cost of off-Site disposal ($79.6 million versus $465 million).

Table 5-3 also shows the cost of disposal per cubic yard of waste. For on-Site disposal, the current and OU 3-13 FS Supplement estimates consider both the volumes of waste expected to be disposed without swell and the design volume for the ICDF (510,000-yd^3 capacity). The off-Site disposal option considers both the current and OU 3-13 FS Supplement estimates using the volumes expected to be disposed at the time of analysis without swell.

Table 5-3. Comparison of the current cost estimates of on-Site versus off-Site disposal and OU 3-13 FS Supplement Report including the calculated cost of disposal per cubic yard.

	Current On-Site Estimate	FS Supplement On-Site Estimate	Current Off-Site Estimate	FS Supplement Off-Site Estimate
Cost ($)	79,627,000	181,248,000	464,975,000	548,371,000
Disposal volume (yd^3)	483,800	465,307	483,800	465,307
ICDF design volume (yd^3)	510,000	510,000	NA[a]	NA
Average cost of disposal for actual inventory ($/$yd^3$)	165	390	961	1,179
Average cost of disposal for ICDF design volume ($/$yd^3$)	156	355	NA	NA

a. NA = not applicable

6. REMEDIATION APPROACH

This section provides the remediation manager with a logical approach to addressing additional contamination when it is encountered during excavation. The extent of contamination to be excavated will be determined in the field using a combination of field screening and analytical techniques to be described in the Group 3 RD/RA work plan. The vertical and horizontal extent of individual Group 3 soil sites to be remediated is generally not well defined. During the initial characterization and subsequent remedial investigation, the extent of contamination was not fully determined. The current individual site boundaries are artificial, and excavations of Group 3 sites are not expected to fit boundaries of sites as they are currently defined.

When there is a potential for sites from different releases to overlap in a single excavation, this should be anticipated in the planning process, and the contaminants of concern (COCs) and extent of contamination from each potential site should be included in excavation planning and waste profile documents.

If the contamination is removed before the site boundaries are reached, the site will be determined to be remediated, and no further excavation will be necessary.

At any given Group 3 excavation there is a potential to encounter additional contamination. This may be more extensive contamination (more volume, outside the site boundaries) or higher levels of the same contamination (same COCs). Additional contamination encountered may also consist of different contaminants than are attributed to the site being remediated.

To meet the remedial action objectives (RAOs), remediation goals are established. These goals generally are quantitative cleanup levels based primarily on risk to human health and the environment. The remediation goals will be used to assess the effectiveness of the selected remedial alternatives in meeting the RAOs. The ROD describes these RAOs as follows:

> Remediation goals for contaminated soils are based on soil concentrations that satisfy the 1×10^{-4} carcinogenic risk goal or non-carcinogenic HI of 1 for current non-workers and future workers and residents. Risk-based soil concentrations corresponding to a 1×10^{-4} risk or a HI of 1 for individual soil COCs are presented in Table 8-1 [presented as Table 6-1 in this document]. If more than one COC is present at a particular release site, these activities or concentrations will be modified so that the cumulative risk is 1×10^{-4} or HI is 1. These risk-based remediation goals will be used to verify the effectiveness of the selected remedial action and to determine if additional remedial action (such as additional excavation) is necessary prior to closing the release site.
> (DOE-ID 1999)

Figure 6-1 is a logic diagram for addressing unexpected contamination during excavation. Two potential scenarios are discussed:

1. Same COCs with additional contamination (bigger excavation required) and/or same COCs with higher concentrations of COCs

2. Additional contamination with different contaminants (different source of release).

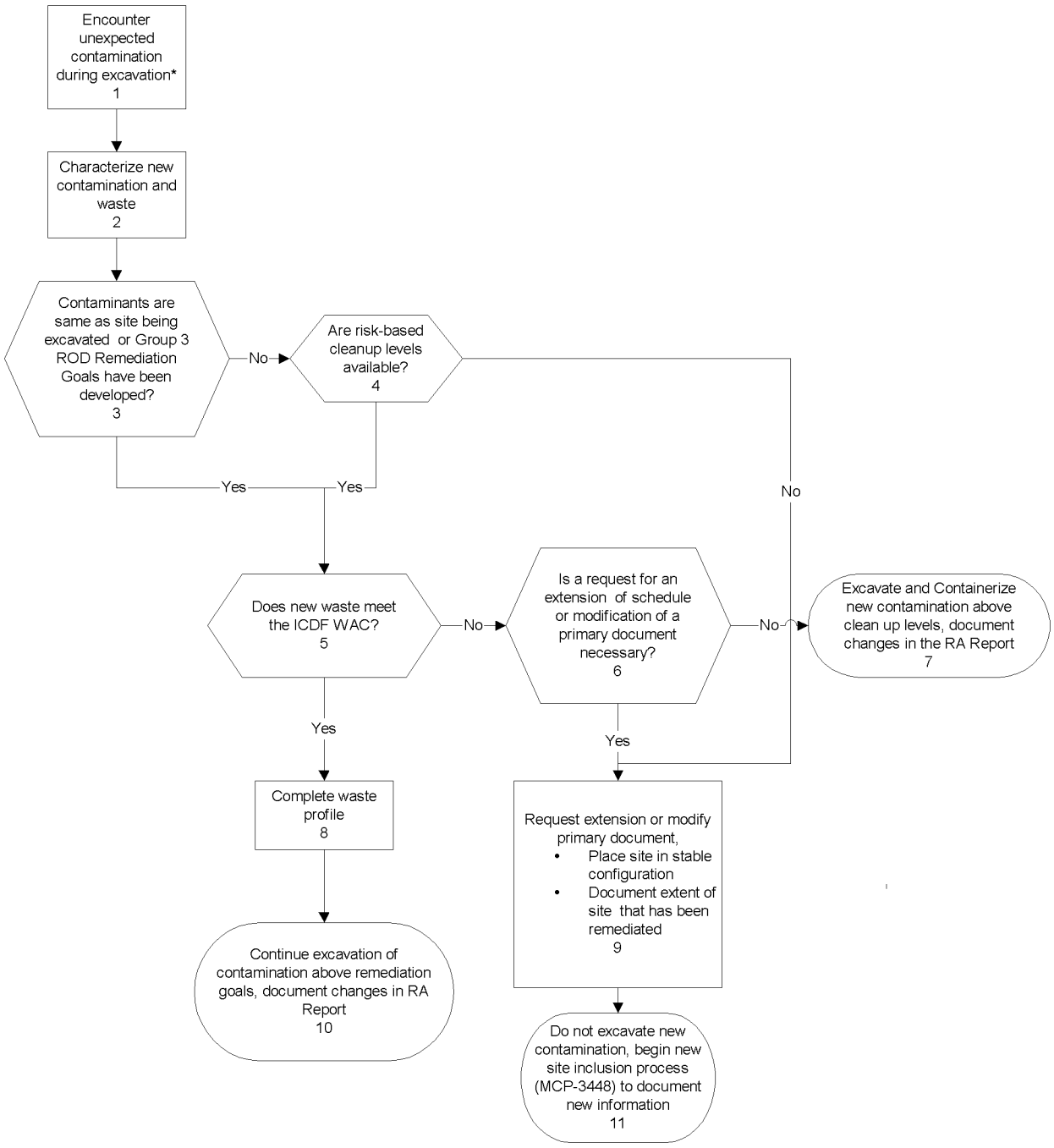


Figure 6-1. Logic diagram for addressing unexpected contamination.

Table 6-1. Soil risk-based remediation goals (from DOE-ID 1999).

Contaminant of Concern	Soil Risk-Based Remediation Goal[a] For Single COCs[b] (pCi/g or mg/kg)
Radionuclides	
Am-241	290
Cs-137	23
Eu-152	270
Eu-154	5200
Pu-238	670
Pu-239/240	250
Pu-241	56,000
Sr-90	223
Nonradionuclides[c]	
Mercury (human health)	23

a. Source of risk-based soil remediation goals: Table 2-1 of the OU 3-13 FS. Risk-based remediation goals developed for residential scenario.

b. If multiple contaminants are present, use a *sum of the fractions* to determine the combined COC remediation goal.

c. The mercury remediation goal was selected from the EPA Region 3, April 1996, screening guidance for soil ingestion under the residential scenario.

It is recognized that various combinations of these scenarios will likely occur. The approach suggested in this section is meant to give the project manager the flexibility to remediate as much as is practicable while at the same time allowing him/her to declare a site remediated if the original contamination as described in the ROD has been removed and newly encountered contamination requires a change in scope to the planned project. Further determination of appropriate actions in response to encountering unexpected contamination during remediation will be developed in the Group 3 RD/RA work plan.

At any given Group 3 excavation there is a potential to encounter unexpected or additional contamination beyond the site "boundary". Unexpected contamination may be discovered during operational screening or sampling and/or sampling for verification and quality assurance activities that will be performed as part of the ICDF waste acceptance process. This section provides the remediation manager with a logical approach to addressing additional contamination when it is encountered during excavation. The extent of contamination to be excavated will be determined in the field using a combination of field screening and analytical techniques. Figure 6-1 is a logic diagram for addressing unexpected contamination during excavation.

The following text summarizes the main points of the logic diagram (Figure 6-1):

- If the additional contamination consists of the same COCs but more extensive or a higher concentration of contamination than anticipated, the excavation will continue. New waste will be compared to the Group 3 contaminants (Box 3) and the ICDF WAC (Box 5). Final extent of the

excavation and the levels of contaminated soil excavated and shipped to the ICDF will be documented in the RA Report.

- Risk-based soil cleanup action levels (Box 4) (for contaminants without ROD remediation goals) may be obtained from other INEEL RODs or from the Region IX soil screening guide.

- If the additional contamination consists of different COCs than those currently listed in the waste profile, it will require a new waste profile. If this new waste meets the ICDF WAC, the excavation is continued and the specifics of the new contamination and extent of excavation are documented in the RA Report (Boxes 5, 8, and 11).

- If the additional contamination does not meet the ICDF WAC and it is not cost effective to containerize the waste, the excavation is not continued into the new contamination. The project manager should document the extent of the original site remediated in the RA Report and begin the new site identification process to address the changed condition (Boxes 5, 6, 7, and 10). Disposal options, including off-Site options, will be evaluated.

- If it is more cost effective to continue the excavation than to close it and possibly re-open it later, then contamination that does not meet the ICDF WAC will be containerized as the excavation continues (Boxes 5, 6, and 9). Disposal options will then be evaluated.

The project Health and Safety Plan and radiological work permit will each have stop work triggers for unexpected conditions and well-defined procedures for resuming the work. It is assumed that unexpected contamination will occasionally trigger these stop work procedures. This discussion is not designed to address re-start issues relating to worker health and safety or radiation control but is intended to provide guidelines to address the issue of encountering unexpected contamination and provide a path forward.

7. SCHEDULE

This report presents the criteria developed in value engineering sessions for grouping the Group 3 release sites into sets and prioritizing these sets for remediation. Several Group 3 sites were examined that overlap or extend under buildings or structures. All or portions of these sites were recommended for management under Group 2 sites. The costs for capping versus excavation of the soil sites were addressed along with that for on-Site versus off-Site disposal. A logical plan to address variations in the anticipated contaminants and contamination volumes during the remediation process was also addressed.

This report will be approved by the regulatory Agencies before submittal of the Group 3 Soils RD/RA work plan. The RD/RA work plan will further evaluate and schedule the prioritized sets of release sites; address management of the release sites, including all or portions of those identified for management under Group 2; and include the remediation approach presented in Section 6 of this report. During development of the RD/RA work plan, an evaluation will be performed to determine the RCRA/HWMA status of the piping through the Group 3 sites. This evaluation will be discussed with the Agencies to better define the scope of the RD/RA work plan. A summary of the remedial design and remedial action deliverables with enforceable milestones for Group 3 soil remediations is provided in Table 7-1. These milestone dates are consistent with the OU 3-13 RD/RA SOW and the FFA/CO process.

Table 7-1. Schedule of Group 3 RD/RA deliverables.

Deliverable	Document/Action Type	Enforceable Date
Draft OU 3-13, Group 3 RD/RA work plan	FFA/CO primary document	8/30/2003
Draft RA report	FFA/CO primary document	TBD[a]

a. The Draft RA Report will be submitted to the Agencies for review within 60 days of the prefinal inspection per the deliverable schedule in the FFA/CO.

8. REFERENCES

40 CFR 264.310, 2001, "Closure and post-closure care," *Code of Federal Regulations*, Office of the Federal Register, July 2001.

15 USC 2601 et seq., 1976, "Toxic Substances Control Act," United Stated Code.

42 USC 6921 et seq., 1976, Subtitle C, "Hazardous Waste Management," *Resource Conservation and Recovery Act of 1976*, as amended.

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DOE-ID, 1997, *Comprehensive RI/FS for the Idaho Chemical Processing Plan OU 3-13 at the INEEL – Part B, FS Report (Final)*, DOE/ID-10572, Rev. 0, Department of Energy Idaho Operations Office, November 1997.

DOE-ID, 1998a, *Comprehensive RI/FS for the Idaho Chemical Processing Plan OU 3-13 at the INEEL – Part B, FS Supplement Report*, DOE/ID-10619, Rev. 2, Department of Energy Idaho Operations Office, October 1998.

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DOE-ID, 2002b, *Waste Acceptance Criteria for ICDF Landfill*, DOE/ID-10865, Rev. 2, Department of Energy Idaho Operations Office, May 2002.

DOE-ID, 2002c, *Remedial Design/Remedial Action Work Plan for the Waste Area Group 3 Staging, Storage, Sizing, and Treatment Facility*, DOE/ID-10889, Rev. 0, Department of Energy Idaho Operations Office, March 2002.

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EDF-ER-326, 2001, "ICDF Design Radiological Control Analysis (Draft Title II)," Rev. 0, Draft, Environmental Restoration Program, Idaho National Engineering and Environmental Laboratory, Idaho Falls, December 2001.

IDAPA 58.01.05.008, 2001, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," Idaho Administrative Procedures Act, Department of Environmental Quality, March 2001. [previously IDAPA 16.01.05.008]

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